	Type	L #	Hits	Search Text	DBs	Time Stamp
1	IS&R	L1	560	((623/1.42) or (623/1.15) or (623/1.3)).CCLS.	USPAT	2003/05/29 12:42
2	IS&R	L2	121	(623/1.42).CCLS.	USPAT	2003/05/29 12:52
3	IS&R	L3	251	((623/1.43) or (623/1.14) or (623/1.46) or (623/1.47) or (623/1.48)).CCLS.	USPAT	2003/05/29 13:01
4	IS&R	L5	436	(623/1.15).CCLS.	USPAT	2003/05/29 13:05
5	BRS	L6	0	therepu$ and stent and strut$	USPAT	2003/05/29 13:05
6	BRS	L7	188	drug$ and stent and strut$	USPAT	2003/05/29 13:06

	Comments	Error Definition	Errors
1			0
2			0
3			0
4			0
5			0
6		Truncation overflow.	1

US-PAT-NO: 6540777

DOCUMENT-IDENTIFIER: US 6540777 B2

TITLE: Locking **stent**

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Abstract Text - ABTX (1):
A **stent** may be constructed to have at least one lockable cell which includes a first locking member and a second locking member. The first and second locking members are movable between a first position in which they are not locked together to a second position in which they are locked together and impart increased scaffolding strength to the **stent**.

TITLE - TI (1):
Locking **stent**

Brief Summary Text - BSTX (2):
The use of **stents** in bodily lumen is well known. A **stent** is typically delivered in an unexpanded state to a desired location in a bodily lumen and then expanded. The **stent** may be expanded via the use of mechanical device such as a balloon or the **stent** may be self-expanding.

Brief Summary Text - BSTX (3):
Because a **stent** often must be delivered through tortuous anatomy, it is desirable for the **stent** to be flexible. It is also desirable for the **stent** to exhibit high scaffolding in the expanded state. In general, however, as **stent** flexibility is increased, scaffolding is decreased and

similarly, as
scaffolding is increased, flexibility is decreased.

Brief Summary Text - BSTX (4):
There remains a need for a stent having a high degree of flexibility in the
unexpanded state and high scaffolding in the expanded state.

Brief Summary Text - BSTX (8):
In one embodiment, the invention is directed to stents comprising a
plurality of interconnected cells where at least one of the interconnected
cells is a lockable cell. The lockable cell includes a first locking member
and a second locking member disposed opposite the first member. The first and
second locking members are movable between a first position in which they do
not lock with one another to a position in which they lock with one another.

Brief Summary Text - BSTX (9):
The first locking member may be a pincer member comprising a first arm and a
second arm and the second locking member may be a tongue. The first and second
arms are movable between a first position in which they do not grip the tongue
and a second position in which they grip the tongue. Desirably, the pincer
members are directly opposite the tongues. Also desirably, the first and
second arms are in the first position when the stent is in the unexpanded state
and in the second position when the stent is in the expanded state. The stent
may comprise a plurality of such cells arrangable in rows, columns or any other
suitable arrangement. Adjacent lockable cells may have one or more walls in
common or may have no walls in common. Individual lockable cells may comprise
a single pincer member and tongue or multiple pincer

members and tongues. The clampable cell may even include pincer members which are constructed and arranged to clamp other pincer members. The pincer member(s) and tongue(s) may extend from the proximal and distal ends of the cell or vice versa or may extend from sidewalls of the cell extending between the proximal and distal ends of the cells.

Brief Summary Text - BSTX (11):

The invention is also directed to **stents** comprised of a plurality of interconnected bands where at least one of the interconnected bands has a first locking member extending therefrom toward an adjacent band and a second locking member extends from an adjacent band. The first and second locking members are movable from a first position in which they do not lock with one another to a second position in which they lock with one another.

Brief Summary Text - BSTX (12):

The first locking member may be a pincer member extending from a band toward an adjacent band. The pincer member has a first arm and a second arm. A tongue extends from the adjacent band. The first and second arms are movable between a first position in which they do not grip the tongue and a second position in which they grip the tongue. Desirably, the pincer members are directly opposite the tongues. Also desirably, the first and second arms are in the first position when the **stent** is in the unexpanded state and in the second position when the **stent** is in the expanded state. The pincer members and tongues may be placed anywhere along the bands. Desirably, the pincer members extend from peaks on bands and the tongues extend from a troughs on a adjacent bands. At least one pair of adjacent bands has at

least one pincer
member and one tongue extending therefrom. Additional pincer members and
tongues may be provided between adjacent bands. Adjacent bands may include
pincer members which grip other pincer members. The bands may desirably be
circumferential bands, substantially longitudinal bands or helical bands.

Brief Summary Text - BSTX (14):

In another embodiment, the invention is directed to **stents** comprising a
plurality of interconnected cells where at least one of the interconnected
cells is a lockable cell. The lockable cell includes a first locking member
and a second locking member. The second locking member is constructed and
arranged to lockingly engage the first locking member on expansion of the
stent. Desirably, the first and second locking members clamp together or
interlock with one another.

Brief Summary Text - BSTX (15):

In yet another embodiment, the invention is directed to **stents** having a
plurality of interconnected bands, where at least one of the interconnected
bands has a first locking member extending therefrom toward an adjacent band
and where the adjacent band has a second locking member which is constructed
and arranged to lockingly engage the first locking member on expansion of the
stent. Desirably, the first and second locking members clamp together or
interlock with one another. Any suitable type of band may be used in the
inventive **stents**. Desirably, each band is serpentine having alternating peaks
and troughs, with the peaks extending in a distal direction and the troughs
extending in a proximal direction. Bands having other geometric patterns that

provide desirable contraction and expansion properties may be used as well.
The bands may desirably be circumferential bands, substantially longitudinal
bands or helical bands.

Drawing Description Text - DRTX (2):
FIG. 1 illustrates a plan view of an expandable **stent** in accordance with the
present invention.

Drawing Description Text - DRTX (3):
FIG. 2 shows a pincer member and tongue which may be used in an inventive
stent;

Drawing Description Text - DRTX (4):
FIGS. 3 and 4 show a portion of an inventive **stent** with a pincer member and
tongue prior to expansion and following expansion of the **stent**;

Drawing Description Text - DRTX (5):
FIGS. 5 and 6 show a portion of an inventive **stent** with a pincer member and
tongue from a **stent** prior to expansion and following expansion of the **stent**;

Drawing Description Text - DRTX (6):
FIG. 7 shows a plan view of an inventive **stent** with interlocking members as
shown in FIGS. 5 and 6;

Drawing Description Text - DRTX (7):
FIGS. 8 and 9 show a portion of an inventive **stent** with a pincer member and
tongue prior to expansion and following expansion of the **stent**;

Drawing Description Text - DRTX (8):

FIG. 10 shows several different interconnecting members which may be used in stents in accordance with the invention;

Drawing Description Text - DRTX (9):
FIGS. 11 and 12 show a portion of a stent with interlocking members;

Drawing Description Text - DRTX (10):
FIG. 13 illustrates a plan view of another inventive stent;

Drawing Description Text - DRTX (11):
FIG. 14 illustrates a plan view of another inventive stent;

Drawing Description Text - DRTX (12):
FIG. 15 illustrates a plan view of a stent having clamping members extending between longitudinal bands;

Drawing Description Text - DRTX (13):
FIG. 16 illustrates an inventive helical stent; and

Drawing Description Text - DRTX (14):
FIG. 17 illustrates a portion of a stent where the locking members lock prior to full expansion of the stent.

Detailed Description Text - DETX (4):
FIG. 1 illustrates an expandable stent 100 having a proximal end 102 and a distal end 104 and a longitudinal axis 103. The stent comprises a plurality of interconnected circumferential serpentine bands 106. Each band 106 has alternating peaks 108 and troughs 110. The peaks are oriented in the distal direction and the troughs are oriented in the proximal direction. Each band

106 has a plurality of pincer members 112 extending therefrom. Each pincer member 112 comprises a first arm 114 and a second arm 116. Opposite each pincer member 112, a tongue 118 extends from an adjacent band. Tongue 118 includes a narrower neck portion 120 and a wider, bulbous head portion 122 which facilitates gripping action between the pincer member and the tongue. As the **stent** is expanded, as shown in FIG. 2, first arm 114 and second arm 116 move toward each other and grip tongue 118 in an locking relationship. The **stent** in the expanded state desirably exhibits greater scaffolding strength than in the unexpanded state.

Detailed Description Text - DETX (5):

Stent 100 further comprises first interconnecting members 124 and second interconnecting members 126. First interconnecting members 124 join together adjacent bands whose pincer members and tongues face each other. Second interconnecting members 126 join together adjacent bands which do not have any pincer members and tongues facing each other.

Detailed Description Text - DETX (7):

Yet another example of a tongue is shown in FIGS. 5, 6 and 7. Tongue 118 is T-shaped. The first arm 114 and the second arm 116 of pincer member 112 are shaped so as to cooperate with tongue 118 allowing pincer member 112 and tongue 118 to lockingly engage one another when the **stent** is expanded. FIG. 7 shows a flat pattern of a **stent** having the locking members shown in FIGS. 5 and 6.

Detailed Description Text - DETX (8):

The flat pattern **stent** of FIG. 7 is shown still attached to the surrounding material 190 from which it was cut. Prior to use, the flat

pattern **stent** must
be severed from surrounding material 190 and rolled to form a tube. Edges 192
and 194 may be welded together or otherwise affixed to one another.

Detailed Description Text - DETX (9):
The embodiment of FIGS. 5-7 further differs from the embodiments of FIGS.
1-4 in that a double clamping mechanism is provided. Specifically, a second
pincer member 128 comprising first 130 arm and second arm 132 is provided
opposite pincer member 112. As the **stent** expands, the arms of the second
pincer member and grip tongue 118 providing additional scaffolding strength to
the **stent** and additional strength to the joint.

Detailed Description Text - DETX (10):
As shown in FIGS. 8 and 9, first arm 130 and second arm 132 of second pincer
member 128 may be long enough so that on expansion of the **stent** they grip arms
114 and 116 of first pincer member 112 in an locking relationship.

Detailed Description Text - DETX (13):
In the embodiment of FIG. 1, the first and second interconnecting member are
of different lengths. The invention also contemplates interconnecting the
bands of the **stent** with only a single type of connector.

Detailed Description Text - DETX (16):
More generally, the invention is directed to a **stent** comprised of a
plurality of interconnected bands where at least one of the interconnected
bands has a first locking member extending therefrom toward a second locking
member extending from an adjacent band.

Detailed Description Text - DETX (17):
Desirably, the first locking member is a pincer member and the second locking member is a tongue. The pincer member has first and second arms which are movable between a first position in which they are not in contact with the tongue or in which they are in slight contact with the tongue, for example, in the crimped state, and a second position in which they grip the tongue. Where more than one pincer member and tongue combination is included in the **stent,** the pincer member and tongue combinations may be regularly distributed throughout the **stent** or randomly distributed. Pincer members may be provided on all of the bands or only on some of the bands. The **stent** of FIG. 1 is arranged so that every other pair of adjacent bands may be locked together.

Detailed Description Text - DETX (18):
The first and second locking members may also be first and second interlocking members. To that end, the invention is also directed to **stents** which include one or more cooperating locking members. The **stent** of FIG. 1 may be modified by replacing the pincer members 112 and tongue 118 with the female 112 and male 118 interlocking members shown in FIG. 10. The operation of the interlocking members of FIG. 11 is shown in FIG. 12. As the **stent** expands, female interlocking member 112 and male interlocking member 118 frictionally engage one another thereby imparting additional rigidity to the **stent**. The interlocking members of FIGS. 11 and 12 are similar to those shown in FIGS. 5 and 6, differing in that the interlocking members of FIGS. 11 and 12 lack the clamping action of the locking members of FIGS. 5 and 6.

Detailed Description Text - DETX (20):

The invention is also directed to stents having a proximal end and a distal end, comprising a plurality of interconnected cells where at least one of the interconnected cells is a lockable cell. Desirably, the lockable cell is clampable or interlocks.

Detailed Description Text - DETX (21):

An embodiment of such a stent comprising a plurality of lockable cells which may be clamped is shown in FIG. 1. Clampable cell 150 is shown hatched in FIG. 1. Each clampable cell 150 includes a first pincer member 112a comprising a first arm 114a and a second arm 116a and a tongue 118a and a second pincer member 112b comprising a first arm 114b and a second arm 116b and a tongue 118b. The operation of the pincer member and tongue has been discussed above. Tongue 118a and pincer member 112a face one another as do tongue 118b and pincer member 112b. First pincer member 112a is situated on the distal end of the cell and second pincer member 112b is located on the proximal end of the cell. Other arrangements are possible as well. For example, both pincer members may be situated on the same side of the cell at either the distal end or the proximal end of the cell. Moreover, the clampable cell may comprise any number of pincers ranging from a single pincer member to two, three, four, five, six or more pincer members. Where multiple pincers are present, the pincers may be circumferentially displaced relative to one another and/or the pincers may be arranged as discussed above with respect to FIGS. 5 and 6. Other pincer member and tongue combinations, including those disclosed above may be used in the clampable cell.

Detailed Description Text - DETX (22):

In the stent of FIG. 1, lockable, clampable cells 150 are arranged in rows. Adjacent rows of clampable cells are joined together by second interconnecting member 126. Stent 100 also comprises non-clampable cells 154, arranged in rows.

Detailed Description Text - DETX (23):

The invention contemplates providing the lockable cells in any other arrangement, random or otherwise. A single lockable cell per row may be provided or multiple clampable cells per row may be provided. Every row may include lockable cells or only some of the rows may include lockable cells. In one embodiment of the inventive stent, every other row of cells is lockable. Rows of lockable cells may alternate with rows of non-lockable cells. In another embodiment of the invention, at least one row of lockable cells is provided at one of the distal end of the stent and the proximal end of the stent. In yet another embodiment of the invention, at least one row of lockable cells is provided between the proximal and distal ends of the stent. The invention also contemplates stents having rows which include lockable cells and non-lockable cells.

Detailed Description Text - DETX (24):

The rigidity of the inventive stents in the expanded state may be controlled by suitably arranging the lockable cells. For example, where a stent with rigid ends and a more flexible middle portion is desired, the lockable cells may be disposed only at the ends of the stent. Similarly, a stent with more flexible ends may be achieved by providing locking cells only between the ends of the stent. A stent with increasing rigidity along its

length may be
provided by increasing the number of lockable cells per row along the length of
the stent or by increasing the number of locking members such as pincer members
and tongues per row of cells as shown in FIG. 13. In the stent of FIG. 13, the
number of pincer members 112 and tongues 118 increases from one end of the
stent to the other end. Where it is desirable to provide more rigidity to the
stent in the unexpanded state, selected locking members may be replaced by
straight connectors.

Detailed Description Text - DETX (25):

The inventive stents may also be provided with a plurality of different
locking members which lock upon varying degrees of expansion of the stent. As
shown in FIG. 14, this may be achieved by varying the displacement between the
arms of the pincer members. Arms 114a and 116a of pincer 112a are closer
together than arms 114b and 116b of pincer 112b, which, in turn, are closer
together than arms 114c and 116c of pincer 112c. A similar effect may be
achieved by maintaining the separation between the arms constant, but altering
the width of the arms in various of the pincers. Moreover, the inventive
stents may contain several differently shaped pincer members and/or tongues.

Detailed Description Text - DETX (27):

In place of the straight longitudinal sections 124 of the lockable cells,
the lockable cells may also include side walls which are curved and generally
longitudinal. The cells may include side walls which are generally oblique to
the longitudinal axis of the stent.

Detailed Description Text - DETX (28):

The invention is also directed to stents have at least one lockable cell.
The lockable cell may comprise a pincer member and tongue and/or a first
interlocking member and a second interlocking member.

Detailed Description Text - DETX (29):
One such embodiment comprising a plurality of interconnected lockable cells
may be realized by substituting the first and second interlocking members of
FIGS. 10 and 11 for the pincer members and tongues of FIG. 1. As discussed
above with respect to FIGS. 11 and 12, the second interlocking member is
constructed and arranged to lockingly engage the first interlocking member on
expansion of the **stent**.

Detailed Description Text - DETX (30):
The invention is also directed to stents having longitudinal bands which may
be locked together. As shown in FIG. 15, stent 100, having a proximal end 102
and a distal end 104, comprises a plurality of longitudinal bands 162. At
least one of the longitudinal bands has at least one pincer member 112
extending therefrom and an adjacent longitudinal band has a tongue member
extending therefrom toward pincer member 112. Desirably, a plurality of pincer
members and tongues extend from adjacent longitudinal bands. Any of the other
clamping members or interlocking members disclosed herein may also be used.
Some adjacent longitudinal bands may have clamping or interlocking members
extending therebetween or all adjacent longitudinal bands may have clamping or
interlocking members extending therebetween. Adjacent longitudinal bands
further have at least one other connector 126 extending there between and
desirably a plurality of connectors therebetween. Adjacent longitudinal bands

may also be connected by straight circumferential connectors or any of the connectors shown in FIG. 10. The stent of FIG. 15 is shown with five longitudinal bands. Additional or fewer longitudinal bands may be provided.

Detailed Description Text - DETX (32):

The invention is also directed to stents comprising at least one lockable cell and, desirably, a plurality of lockable cells having locking members. Desirably the locking members are clamping or interlocking members, extending from substantially longitudinally extending sidewalls. As shown in FIG. 15, cell 150 comprises a first substantially longitudinal sidewall 165, desirably serpentine, a second substantially longitudinal sidewall 167, desirably serpentine, a proximal wall 126a and a distal wall 126b. Pincer members 112 extends from first sidewall 165 and tongue member 118 extends from second sidewall 167 toward pincer member 112. On expansion of the stent, the pincer member clamps on the tongue.

Detailed Description Text - DETX (33):

The invention is also directed to helical stents having adjacent helical bands which may be locked together and to helical stents having one or more cells which have locking members. Desirably, the stent comprises clamping members or interlocking members. As shown in FIG. 16, helical stent 100, has a proximal end 102 and a distal end 104. Stent 100 comprises a serpentine band 106 which extends helically about longitudinal axis 103. Interconnecting members 124 extend from peaks 108 on a serpentine band to troughs 110 on adjacent helical turns of the serpentine band. Interconnecting members 124 may be replaced by any of the other interconnecting members

shown in FIG. 10. The stent further comprises pincer members 112 and tongues 118. Pincer members 112 and tongues 118 may extend from peaks or troughs of the serpentine bands. Pincer members 112 are disposed opposite tongues 118 on adjacent helically extending serpentine bands. On expansion of the stent, the pincer members lock onto the tongues. Any of the other pincer members, tongues and interlocking members disclosed herein may also be used in the helical stent. Additional or fewer interconnecting members may be provided in the stent. Similarly, additional or fewer pincer member/tongue pairs or interlocking members may be provided.

Detailed Description Text - DETX (34):
The inventive helical stents may be made of a single serpentine band extending helically about the longitudinal axis of the stent or may be made of a plurality of serpentine bands helically extending about the longitudinal axis of the stent. Additionally, the inventive helical stents may be made of one or more non-serpentine bands extending helically about the longitudinal axis of the stent.

Detailed Description Text - DETX (35):
The invention is also directed to stents having locking members which lock prior to the complete expansion of the stent. This may be achieved by varying the thickness and/or width of peaks and/or troughs from which clamping members extend relative to the thickness and/or width of peaks and/or troughs from which no locking members extend or by varying the width or thickness of struts 107 which form serpentine bands 106 to control the expansion of the stent. In

addition to varying

Detailed Description Text - DETX (36):
As shown in FIG. 17, a portion of a **stent** is provided with bands 106 comprising peaks 108a from which no clamping members extend and peaks 108b from which clamping members 128 extend. Bands 106 further comprise troughs 110a from which no clamping members extend and troughs 110b from which clamping members 112 extend. Peaks 108a and troughs 110a from which no clamping members extend are wider than peaks 108b and troughs 110b from which clamping members extend. The narrower peaks 108b and troughs 110b will open prior to wider peaks 108a and troughs 110a. With such an arrangement and the appropriate relative widths, the clamping of the clamping members may be the first action during expansion of the **stent**.

Detailed Description Text - DETX (37):
With further reference to FIG. 17, clamping of the cells prior to complete expansion of the **stent** may also be achieved by modifying **struts** 107b relative to **struts** 107a. For example, **struts** 107b may be thinner or narrower than **struts** 107a.

Detailed Description Text - DETX (38):
As discussed above, the thickness of the peaks and troughs may also be varied. For example, a **stent** may be provided with thinner peaks and troughs with locking members extending therefrom and thicker peaks and troughs without any clamping members extending therefrom. The peaks and troughs from which locking members extend may also be subject to different treatments (whether heat treatment, chemical treatment or any other treatment) relative to the

peaks and troughs from which no locking members extend to provide peaks and troughs with locking members which open before other peaks and troughs.

Detailed Description Text - DETX (39):
In one embodiment, the inventive stent consists entirely of bands such as those shown in FIG. 17 so that all of the locking members lock prior to complete expansion of the stent when the stent is expanded uniformly.

Detailed Description Text - DETX (40):
The invention also contemplates an embodiment in which the first and second locking members extend from peaks and troughs which open later, with peaks and troughs which open earlier not having any locking members extending therefrom. In this embodiment, the locking members lock as the expansion of the stent is completed.

Detailed Description Text - DETX (41):
In another embodiment, the stent is provided with a plurality of locking cells which require different amounts of force to lock. For example, the peaks from which locking members extend at the distal end of the stent may be narrower than the peaks from which locking members extend at the proximal end of the stent while the peaks from which no locking members expand may be wider at the distal end of the stent than at the proximal end of the stent. Assuming a uniform expansion of the stent, such a stent would lock at the distal end prior to at the proximal end.

Detailed Description Text - DETX (42):
The locking members whether clamping members or

interlocking members or
otherwise may be oriented in a longitudinal direction, in a circumferential
direction or at an angle oblique to the longitudinal axis of the **stent**.

Detailed Description Text - DETX (43):
The invention also contemplates **stents** with locking members and
interconnected bands whether circumferential, longitudinal, helical or
otherwise where adjacent bands are dissimilar in frequency and/or amplitude.

Detailed Description Text - DETX (44):
More generally, the invention contemplates **stents** formed of any types of
bands whether serpentine or otherwise and whether circumferential,
longitudinal, helical or otherwise. The serpentine bands may be characterized
by a single wavelength or by a plurality of wavelengths and may comprise
interconnected **struts** of a single length or interconnected **struts** of a
plurality of different lengths. Moreover, the serpentine bands may be
characterized by a regular pattern or by an irregular patters. Bands having
other geometric patterns that provide desirable contraction and expansion
properties may be used as well. Examples of other types of bands that may be
used include bands having openings therein of any suitable shape, including
bands with triangular openings, diamond shaped openings, rectangular openings
and more generally, polygonal openings, circular openings and more generally,
openings having a curvilinear boundary. All of the bands in the **stent** may be
identical or some or all of the bands may differ from one another. The bands
may be characterized as having regular or irregular patterns. The **stent** may
incorporate bands having a single wavelength and/or

amplitude and/or bands
having multiple wavelengths and/or amplitudes. The bands may also be
non-serpentine, for example, purely circular.

Detailed Description Text - DETX (45):
Locking members may be disposed in longitudinal rows along the length of the
stent or in helical patterns along the length of the **stent** or in any other
pattern.

Detailed Description Text - DETX (46):
The various modifications to the structure of the inventive **stents** discussed
above and below with respect to inventive **stents** comprising one or more pincer
members may also be made to inventive **stents** comprising interlocking members
and vice versa. Furthermore, any modifications of the structure discussed
above and below with respect to the **stent** with clampable cell structures may
also be made to an inventive **stent** with interlockable cells structure.

Detailed Description Text - DETX (47):
Any of the inventive **stents** disclosed above may be provided with a uniform
diameter or may taper in portions or along the entire length of the **stent**.
Also, the width and/or thickness of the various portions of the inventive
stents may increase or decrease along a given portion of the **stent**. For
example, the width and/or thickness of the bands may increase or decrease along
portions of the **stent** or along the entire length of the **stent**.

Detailed Description Text - DETX (48):
The invention is also directed to bifurcated **stents** having locking. Both

branches of a bifurcated **stent** may contain locking members or only a single branch may contain locking members. The relative rigidity of the branches of a bifurcated **stent** may also be controlled by providing different distributions of locking members in each of the branches. Thus, an inventive bifurcated **stent** may have two branches which are equally rigid or one branch which is more rigid than another branch. Bifurcated **stents** may also be provided with branches which require different amounts of force to lock.

Detailed Description Text - DETX (49):

The inventive **stents** may be manufactured using known **stent** manufacturing techniques including laser cutting, laser welding, chemically etching, electrode discharge machining or stamping a tube or a sheet. In the case of a sheet, the sheet is then rolled and welded. The inventive **stents** may also be molded with the desired design or may be made by growing or extruding or winding a **stent** with the inventive patterns.

Detailed Description Text - DETX (50):

Any suitable **stent** material may be used in the manufacture of the inventive **stents**. Examples of such materials include metals such as stainless steel, tantalum, elgiloy and shape memory metals such as nitinol. The inventive **stents** may also be made of suitable polymeric materials.

Detailed Description Text - DETX (51):

The inventive **stents** may include suitable radiopaque coatings. For example, the **stents** may be coated with gold or sputtered with tantalum. The **stents** may also be made directly from a radiopaque material to obviate the need for a radiopaque coating or may be made of a material having a

radiopaque inner core.

Detailed Description Text - DETX (52):
The inventive **stents** may also be provided with various bio-compatible coatings to enhance various properties of the **stent**. For example, the inventive **stents** may be provided with lubricious coatings. The inventive **stents** may also be provided with **drug-containing** coatings which release **drugs** over time.

Detailed Description Text - DETX (53):
The inventive **stents** may also be provided with a sugar or more generally a carbohydrate and/or a gelatin to maintain the **stent** on a balloon during delivery of the **stent** to a desired bodily location. Other suitable compounds for treating the **stent** include biodegradable polymers and polymers which are dissolvable in bodily fluids. Portions of the interior and/or exterior of the **stent** may be coated or impregnated with the compound. Subjecting the **stent** to such a treatment also may prevent flaring of the ends of the **stent** during delivery of the **stent**. Mechanical retention devices may also be used to maintain the **stent** on the balloon during delivery.

Detailed Description Text - DETX (54):
The inventive **stents** may be used inside the lumina of any physiological conduit including arteries, veins, vessels, the biliary tree, the urinary tract, the elementary tract, the tracheal bronchial tree, the genitourinary system, and the cerebral aqueduct.

Claims Text - CLTX (1):
1. A **stent** having a proximal end and a distal end, the

stent comprising a plurality of interconnected cells, at least one of the interconnected cells being a lockable cell, the lockable cell including; a first locking member and a second locking member disposed opposite the first member, the first and second locking members movable between a first position in which they do not lock with one another to a position in which they lock with one another; wherein the first locking member is a pincer member comprising a first arm and a second arm, and the second locking member is a tongue, the first arm and the second arm moving toward one another to grip the tongue on expansion of the stent.

Claims Text - CLTX (2):
2. The stent of claim 1 comprising a plurality of lockable cells, the lockable cells constructed and arranged so that the stent exhibits greater scaffolding strength when the stent is expanded.

Claims Text - CLTX (3):
3. The stent of claim 1, expandable from an unexpanded state to an expanded state, the first and second arms in the first position when the stent is in the unexpanded state, the first and second arms in the second position when the stent is in the expanded state.

Claims Text - CLTX (4):
4. The stent of claim 3 comprising a plurality of lockable cells.

Claims Text - CLTX (5):
5. The stent of claim 4 wherein the lockable cells are arranged in rows.

Claims Text - CLTX (6):
6. The **stent** of claim 5 wherein adjacent rows of lockable cells are connected by at least one connector member extending between the rows.

Claims Text - CLTX (7):
7. The **stent** of claim 4 comprising at least two types of lockable cells including at least one proximal lockable cell in which the pincer member is situated at a proximal end of the cell and the tongue is situated at the distal end of the cell; and at least one distal lockable cell in which the pincer member is situated at a distal end of the cell and the tongue is situated at the proximal end of the cell.

Claims Text - CLTX (8):
8. The **stent** of claim 1 wherein the lockable cell is a multiply lockable cell comprising a plurality of pincer members and a plurality of tongues.

Claims Text - CLTX (9):
9. The **stent** of claim 8 wherein one of the pincer members is situated at a distal end of the cell and one of the pincer members is located at a proximal end of the cell.

Claims Text - CLTX (10):
10. The **stent** of claim 9 comprising a plurality of multiply lockable cells.

Claims Text - CLTX (11):
11. The **stent** of claim 1, the lockable cell comprising a plurality of pincer members including a first pincer member comprising a first arm and a second arm and a tongue disposed between the first arm and

the second arm and a
second pincer member comprising a first arm and a second arm, the first pincer
member situated opposite the second pincer member, wherein the first and second
arms of the second pincer member grip the tongue of the first pincer member on
expansion of the **stent** and the first and second arms of the second pincer
member grips the first pincer member of the **stent**.

Claims Text - CLTX (12):
12. The **stent** of claim 1 wherein the lockable cell includes a serpentine
shaped proximal end, a serpentine shaped distal end, a first sidewall extending
between the serpentine shaped proximal end and the serpentine shaped distal
end, and a second sidewall extending between the serpentine shaped proximal end
and the serpentine shaped distal end, the tongue and the pincer member disposed
between the first sidewall and the second sidewall.

Claims Text - CLTX (13):
13. The **stent** of claim 1 wherein the first locking member is an
interlocking member and the second locking member is an interlocking member,
the first and second interlocking members constructed and arranged to interlock
with one another upon expansion of the **stent**.

Claims Text - CLTX (14):
14. A **stent** having a proximal end and a distal end, the **stent** comprising a
plurality of interconnected cells, at least one of the interconnected cells
being a lockable cell, the lockable cell including; a first locking member and
a second locking member disposed opposite the first member, the first and
second locking members movable between a first position in which they do not
lock with one another to a position in which they lock with

one another; the
first locking member is a pincer member comprising a first arm and a second arm
and the second locking member is a tongue, the first and second arms disposed
in a first position in which they do not grip the tongue and movable between
the first position and a second position in which they grip the tongue, the
tongue including a narrow neck portion and a wider head portion.

Claims Text - CLTX (15):
15. A **stent** comprised of a plurality of interconnected bands, at least one
of the interconnected bands having a first locking member extending therefrom
toward an adjacent band, a second locking member extending from an adjacent
band, the first and second locking members movable from a first position in
which they do not lock with one another to a second position in which they lock
with one another; wherein the first locking member is a pincer member
comprising a first arm and a second arm, and the second locking member is a
tongue, the first arm and the second arm moving toward one another to grip the
tongue on expansion of the **stent**.

Claims Text - CLTX (16):
16. The **stent** of claim 15 wherein the first locking member is a pincer
member having a first arm and a second arm and the second locking member is a
tongue extending from the adjacent band, the first and second arms gripping the
tongue in the second position.

Claims Text - CLTX (17):
17. The **stent** of claim 16 expandable from an unexpanded state to an
expanded state, the first and second arms in the first position when the **stent**

is in the unexpanded state, the first and second arms in the second position
when the **stent** is in the expanded state.

Claims Text - CLTX (18):
18. The **stent** of claim 17 wherein each band is serpentine having
alternating peaks and troughs, the peaks extending in a distal direction, the
troughs extending in a proximal direction.

Claims Text - CLTX (19):
19. The **stent** of claim 18 wherein the pincer member extends from a peak on
a band and the tongue extends from a trough on an adjacent band.

Claims Text - CLTX (20):
20. The **stent** of claim 16, at least one of the interconnected bands having
a plurality of pincer members extending therefrom toward an adjacent band, each
pincer member having a first arm and a second arm, the adjacent band having a
plurality of tongues extending therefrom, the first and second arms of each
pincer member movable between a first position in which they are not in contact
with one of the tongues and a second position in which they grip one of the
tongues.

Claims Text - CLTX (21):
21. The **stent** of claim 16, wherein a plurality of bands each have at least
one pincer member extending therefrom toward a tongue extending from an
adjacent band.

Claims Text - CLTX (22):
22. The **stent** of claim 15 wherein the bands extend circumferentially.

Claims Text - CLTX (23):
23. The **stent** of claim 15 wherein the bands extend longitudinally.

Claims Text - CLTX (24):
24. The **stent** of claim 15 wherein the bands extend helically.

Claims Text - CLTX (25):
25. The **stent** of claim 16 the adjacent band comprising a second pincer member which comprises a first arm and a second arm, the tongue disposed between the first and second arms of the second pincer member, the first pincer member situated opposite the second pincer member, wherein the first and second arms of the second pincer member grip the tongue of the first pincer member on expansion of the **stent** and the first and second arms of the second pincer member grips the first pincer member of the **stent**.

Claims Text - CLTX (26):
26. The **stent** of claim 15 wherein the first locking member is a first interlocking member and the second locking member is a second interlocking member, the first and second interlocking members constructed and arranged to interlock with one another upon expansion of the **stent**.

Claims Text - CLTX (27):
27. A **stent** comprised of a plurality of interconnected bands, at least one of the interconnected bands having a first locking member extending therefrom toward an adjacent band, a second locking member extending from an adjacent band, the first and second locking members movable from a first position in which they do not lock with one another to a second position in which they lock

with one another, the first locking member is a pincer member having a first
arm and a second arm and the second locking member is a tongue extending from
the adjacent band, the first and second arms gripping the tongue in the second
position, the tongue including a narrow neck portion and a wider head portion.

Claims Text - CLTX (28):
28. A **stent** having a proximal end and a distal end, the **stent** comprising a
plurality of interconnected cells, at least one of the interconnected cells
being a lockable cell, the lockable cell including a first locking member and a
second locking member, the second locking member constructed and arranged to
lockingly engage the first locking member on expansion of the **stent**, wherein
the first locking member is a pincer member comprising a first arm and a second
arm, and the second locking member is a tongue, the first arm and the second
arm moving toward one another to grip the tongue on expansion of the **stent**.

Claims Text - CLTX (29):
29. The **stent** of claim 28 comprising a plurality of lockable cells.

Claims Text - CLTX (30):
30. The **stent** of claim 29 comprising rows of lockable cells and at least
one row of non-lockable cells.

Claims Text - CLTX (31):
31. The **stent** of claim 30 comprising a plurality of rows of non-lockable
cells, wherein the rows of lockable cells alternate with the rows of
non-lockable cells along the length of the **stent**.

Claims Text - CLTX (32):
32. The **stent** of claim 30 where at least one row of lockable cells is provided at one of the distal end of the **stent** and the proximal end of the **stent**.

Claims Text - CLTX (33):
33. The **stent** of claim 30 wherein at least one row of lockable cells is provided between the proximal and distal ends of the **stent**.

Claims Text - CLTX (34):
34. The **stent** of claim 28 wherein the number of lockable cells disposed about the periphery of the **stent** increases from one end of the **stent** to the other.

Claims Text - CLTX (35):
35. The **stent** of claim 28 wherein the first locking member clamps to the second locking member on expansion of the **stent**.

Claims Text - CLTX (36):
36. The **stent** of claim 28 wherein the first locking member and the second locking member interlock with one another.

Claims Text - CLTX (37):
37. An unexpanded **stent** comprised of a plurality of connected bands at least one of the bands having a first locking member extending therefrom toward an adjacent band, the adjacent band having a second locking member, the second locking member lockingly engaging the first locking member when the **stent** is in an expanded state, wherein the first locking member is a pincer member comprising a first arm and a second arm, and the second locking member is a

tongue, the first arm and the second arm moving toward one another to grip the
tongue on expansion of the **stent**.

Claims Text - CLTX (38):
38. The **stent** of claim 37 wherein the first locking member is a first
interlocking member and the second locking member is a second interlocking
member, the second interlocking member constructed and arranged to interlock
with the first interlocking member on expansion of the **stent**.

Claims Text - CLTX (39):
39. The **stent** of claim 38 plurality of the bands each having at least one
first interlocking member extending therefrom toward a second interlocking
member extending from an adjacent band, wherein the first interlocking member
is a female member and the second interlocking member is a male member.

Claims Text - CLTX (40):
40. The **stent** of claim 37 wherein at least one of the proximal end of the
stent and the distal end of the **stent** are provided with first and second
locking members which are positioned to be lockable.

Claims Text - CLTX (41):
41. The **stent** of claim 37 wherein the number of first locking members
increases from one end of the **stent** to the other end of the **stent**.

Claims Text - CLTX (42):
42. The **stent** of claim 37 wherein the bands are non-serpentine in shape.

Claims Text - CLTX (43):
43. The **stent** of claim 37 wherein the bands are serpentine and comprise
stronger and weaker peaks and stronger and weaker troughs, the first and second
locking members extending from the weaker peaks and troughs.

Claims Text - CLTX (44):
44. The **stent** of claim 37 wherein the bands are serpentine and comprise
peaks and troughs which open earlier and peaks and troughs which open later on
expansion of the **stent,** the first and second locking members extend from the
peaks and troughs which open earlier.

on from the
vapor phase, are expected to be useful for this purpose.

Brief Summary Text - BSTX (15):
Preferably, when the device is intended for use in the vascular system, the bioactive material in the at least one layer is heparin or another antiplatelet or antithrombotic agent, or **dexamethasone, dexamethasone** acetate, **dexamethasone** sodium phosphate, or another **dexamethasone** derivative or anti-inflammatory steroid. Furthermore, a wide range of other bioactive materials can be employed, including, but not limited to, the following categories of agents: thrombolytics, vasodilators, antimicrobials or antibiotics, antimitotics, antiproliferatives, antisecretory agents, non-steroidal antiinflammatory **drugs,** immunosuppressive agents, growth factor antagonists, free radical scavengers, antioxidants, biologic agents, radiotherapeutic agents, radiopaque agents and radiolabelled agents. The major restriction is that the bioactive material must be able to withstand the vacuum employed during vapor deposition or plasma deposition of the at least one porous layer, that is, the bioactive material must have a relatively low vapor pressure at the deposition temperature, typically, near or at room temperature.

Brief Summary Text - BSTX (19):
The device can include two or more layers of different bioactive materials atop the structure. These additional la

. However, the underlying structure of implantable device 10 can be of virtually any design.

Detailed Description Text - DETX (22):

In some embodiments, the therapeutic substance includes, but is not limited to, antineoplastic, antimitotic, antiinflammatory, antiplatelet, anticoagulant, antifibrin, antithrombin, antiproliferative, antibiotic, antioxidant, antiallergic, antiangiogenic, and angiogenic substances as well as combinations thereof. Examples of such antineoplastics and/or antimitotics include **paclitaxel** (e.g., TAXOL by Bristol-Myers Squibb Co., Stamford, Conn.), docetaxel (e.g., TAXOTERE from Aventis S.A., Frankfurt, Germany) methotrexate, azathioprine, vincristine, vinblastine, fluorouracil, doxorubicin hydrochloride (e.g., ADRIAMYCIN from Pharmacia & Upjohn, Peapack N.J.), and mitomycin (e.g., MUTAMYCIN from Bristol-Myers Squibb Co., Stamford, Conn.) Examples of such suitable antiinflammatories include glucocorticoids such as **dexamethasone,** methylprednisolone, hydrocortisone and betamethasone, superpotent glucocorticoids such as clobustasol, halobetasol, and diflucortolone, and non-steroidal antiinflammatories such as aspirin, indomethacin and ibuprofen. Examples of such antiplatelets, anticoagulants, antifibrin, and antithrombins include sodium heparin, low molecular weight heparins, heparinoids, hirudin, argatroban, forskolin, vapiprost, prostacyclin and prostacyclin analogues, dextran, D-phe-pro-arg-chloromethylketone (synthetic antithrombin), dipyridamole, glycoprotein IIb/IIIa platelet membrane receptor antagonist antibody, recombinant hirudin, and thrombin inhibitors such as ANGIOMAX (Biogen, Inc., Cambridge, Mass.) Examples of such cytostatic or antiproliferative agents include **actinomycin** D as well as